

CLAIMS

1. A particle separation apparatus comprising a cyclone particle separating means, particle collecting chamber and a fan driven by an electric motor for drawing particle laden air into and through the apparatus wherein a valve is provided, upstream of the suction fan driving motor and downstream of the cyclone particle separating means, which includes a valve closure and a valve seat against which the closure is normally resiliently urged to prevent air flowing through the valve, and the valve is mounted so as to communicate with a passage between the cyclone particle separating means and the fan so that air pressure within the passage acts on one side of the closure while the other side of the closure is exposed to ambient air pressure, whereby in use if the air pressure in the passage leading from the cyclone particle separating means to the fan falls below ambient by more than a predetermined amount, the pressure differential acting on the closure creates a force sufficient to overcome the resilient force acting thereon and the closure will become displaced from the seating and allow air to enter the passage to maintain an air flow to and around the fan motor.
2. Apparatus as claimed in claim 1 wherein the closure is urged into the closed position by a resiliently deformable member acting on the one side of the closure.
3. Apparatus as claimed in claim 1 or 2 wherein the closure is located within a hollow housing and the resiliently deformable member is a spiral spring which acts between the rear of the closure and one end of the housing and an opening is provided in the opposite end of the housing defining the valve seating, and the area of the opening is less than the area of the closure.
4. Apparatus as claimed in claim 3 wherein an elongate guide extends rearwardly from the closure and the said one end of the housing has an opening therein within which the guide is a sliding fit.

5. Apparatus as claimed in any of claims 1 to 4 wherein the closure is a generally flat plate.
6. Apparatus as claimed in any of claims 1 to 4 wherein the closure is shaped so as to provide a curved or conical or frusto-conical surface for contacting and sealing against the seating.
7. Apparatus as claimed in any of claims 1 to 4 or 6 wherein the seating is a circular opening and the closure is at least hemispherical with its convex curved surface towards the seating and the radius of curvature of the curved surface of the closure is greater than the radius of the circular opening forming the seating.
8. Apparatus as claimed in any of claims 1 to 7 wherein the seating includes or is formed from or coated or covered by a ring of resiliently deformable material so that an airtight seal is created when the closure is pressed thereagainst.
9. Apparatus as claimed in claim 8 wherein the ring is formed from rubber.
10. Apparatus as claimed in claim 8 or 9 wherein the ring is an O-ring seal.
11. Apparatus as claimed in any of claims 1 to 4 or 6 to 10 wherein the closure is a hollow ball.
12. Apparatus as claimed in claim 11 wherein the ball is spherical and is formed from low-density plastics material.
13. Apparatus as claimed in claim 11 or 12 wherein the ball includes at least one opening in the wall of the half thereof which is remote from the half which co-operates with the annular seating, so that the pressure within the ball is always the same as the pressure within the housing.

14. Apparatus as claimed in any of claims 11 to 13 when dependent from claim 4 wherein the guide is hollow and open at both ends to communicate between the interior of the ball and the passage, whereby ambient air released into the housing due to a pressure differential acting on the ball sufficient to unseat the ball from the seating, can pass from the housing via the ball and interior of the guide to the passage between cyclone and fan, to increase the air flow to and around the motor.
15. Apparatus as claimed in any of claims 11 to 13 when dependent from claim 4 or claim 14 wherein the said one end wall of the housing is formed with at least one opening to communicate between the interior of the housing and the passage through which ambient air can pass when the valve is opened.
16. Apparatus as claimed in any of claims 4 to 15 wherein the housing is cylindrical.
17. Apparatus as claimed in claim 16 wherein the housing is formed from two cylindrical parts, one part having an opening defining the valve seating in an end thereof and its other end being open, and the other part having an opening for the guide in one end thereof and is likewise open at its other end, and the two open ends of the two parts are adapted to be joined the one to the other, so that the two parts extend coaxially and form the cylindrical housing.
18. Apparatus as claimed in claim 17 wherein the said one end of the said other part includes at least one other opening to provide for airflow between the housing and the said passage.
19. Apparatus as claimed in claim 15 or 18 wherein the end of the housing having the opening for the guide therein is adapted to be fitted into or around a port in a wall of the said passage, so as to attach the housing to the apparatus and communicate with the passage via the said port.

20. Apparatus as claimed in any of claims 4 to 19 wherein a helical spring is fitted around the elongate guide and the spring and guide are freely relatively slidable.
21. Apparatus as claimed in claim 20 wherein when the closure is lifted off the seat, the guide slides relative to and through the said one end of the housing containing the opening therefor, the spring becomes compressed between the closure and the said one end of the housing, and the compression stores energy in the spring which creates a restoring force acting on the closure to move the latter back into sealing engagement with the seating when a pressure differential causing the initial lifting of the closure drops, such as occurs when a blockage upstream of the passage is cleared, or after the fan motor is switched off.
22. Apparatus for separating particles from an airstream constructed, arranged and adapted to operate substantially as herein described by way of example and with reference to the accompanying drawings.